Experimenting with Plants

**Overview:**
In this lesson, students will learn about the scientific method. Students will then have the opportunity to plan and conduct two science experiments involving plants.

**Procedure:**
**Part One: Whole-Group Instruction:**
- Show students the Brain Pop Jr. video about the scientific method.
- Identify and define key parts of the scientific method: Question, hypothesis, independent variable, dependent variables, data and conclusion.
- Students can sequence word cards with the parts of the scientific method on them.
- Model planning an experiment using a similar topic and guiding students through each part of the process.

**Part Two: Independent Work/Collection of Evidence:**
- One student at a time complete pages 1-2 of the first science experiment (see pages 4-5 of this lesson plan).
- Have students choose which type of seeds to plant, planting the seeds in separate flowerpots and place one plant in direct sunlight and the other plant in a dark location.
- Student will construct two graphs using graph paper or pre-labeled graphs (one graph per plant) to track the growth of the plants each day.
- Student will measure the height of each plant once a day for two weeks.
- After two weeks, the student will complete page 3 of the science experiment (see page 6 of this lesson plan) to analyze his or her graph and draw a conclusion.
- Student will repeat this process with a similar experiment so the topic will be familiar (see pages 7-9 of this lesson plan).

**ASOL Covered in this Activity:**

**3S-SI 1:** The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which j) conclusions are drawn.

**5S-SI 1:** The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which f) independent and dependent variables are identified.

**8S-SI 1:** The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations which h) data are analyzed and communicated through graphical representation.

**HSS-SI 2:** The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. Key concepts include
b) evidence is required to evaluate hypotheses and explanations; 
c) observation and logic are essential for reaching a conclusion.

Materials Needed:
- Sunflower seeds
- Lima bean seeds
- 4 small flower pots (per student)
- Rulers (with centimeters)
- Science experiment packets (attached)
- Blank graph paper

Instructional Setting:
- Classroom
- Part one: Whole-group or small-group; Part 2: Independently

Community Connections and/or Peer Interaction:
- Pairs to practice measuring the length of different items.
- Purchase necessary supplies at a store
- Visit a local nursery to see seed to plant process

Functional Activity/Routine:
- Care for classroom plants
- Create a shopping list for necessary items
- Find price of items at store and calculate the cost of the items

Strategies to Collect Evidence:
- Work sample of two science experiments
- Photos of students caring for/measuring plants

Specific Options for Differentiating this Activity:
- Assistive technology: Incorporate key vocabulary words into augmentative communication system
- Complete graph data with pre-made graphs and Velcro pieces rather than by writing
- Picture supports and choices increased in size or eliminated from the science experiment packets
- Adapt questions to require open-ended or extended responses
Planning an Experiment

1. Ask a question!

What question are we going to answer in this experiment?

   a. Will plants grow faster in the light or in the dark?
   b. Will plants grow faster with more water?

2. Make a hypothesis:

I think that plants will grow faster in the ________________.

   a. light                  b. dark

3. Independent variable:

   It is important to change only one thing in an experiment so we can answer our question. What will be different about the plants we use in this experiment?

   a. amount of light each plant gets
   b. amount of water we give to each plant

We need to put the plants in different spots so they will get different amount of light. Where can we put a plant in the classroom so it will get the MOST amount of light?

   ![windowsill] ![desk] ![closet]

Where can we put a plant in the classroom so it will get the LEAST amount of light?

   ![windowsill] ![desk] ![closet]
Name _____________________________        Date ________________________

4. Dependent variables:

We need to plant the same kind of seeds to show if location effects a plant's growth. What kind of seeds will we plant in this experiment?

![Lima bean sprout and sunflower seeds]

How much water will we give to the plants each morning and afternoon?

____________ mL

5. Recording Data:

What will you use to measure the growth of the plants each day?

[thermometer, scale, ruler]

What kind of graph can we use to keep track of the data?

[bar graph, line graph]
Name ____________________________     Date ___________________________

6. Analyzing the Data:

How tall did the plant on the windowsill grow by day 10? ________________

How tall did the plant in the closet grow by day 10? ________________

Which plant grew the tallest by day 10?

7. Drawing Conclusions:

Where did the lima beans grow faster?

What do plants need to grow?

______________________________________________________________________
Planning an Experiment-2

1. Ask a question!

What question are we going to answer in this experiment?

   a. Will plants grow faster in the light or in the dark?
   b. Will plants grow faster with water?

2. Make a hypothesis:

I think that plants will grow faster with ____________________.

   a. water                 b. no water

3. Independent variable:

It is important to change only one thing in an experiment so we can answer our question. What will be different about the plants we use in this experiment?

   a. amount of light each plant gets
   b. amount of water we give to each plant

How much water will we give to the first plant each morning and afternoon?

_________________ mL

How much water will we give to the second plant each morning and afternoon?

_________________ mL

4. Dependent variables:

We need to plant the same kind of seeds to show if the amount of water effects a plant's growth. What kind of seeds will we plant in this experiment?

[Images of lima bean sprout and sunflower seeds]
We need to put the plants in the same place to show it the amount of water effects a plant's growth. Where can we put the plants in the classroom so that they will get the same amount of sunlight?

5. Recording Data:

What will you use to measure the growth of the plants each day?

What kind of graph can we use to keep track of the data?
6. Analyzing the Data:

How tall did the plant with water grow by day 10? ______________________

How tall did the plant with NO water grow by day 10? ____________________

Which plant grew the tallest by day 10?

7. Drawing Conclusions:

Which sunflower grew faster?

What do plants need to grow?

____________________________________________________________________